

What is claimed is:

1. A curable coating composition comprising

5 a. a resinous binder comprising:

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B17 i. a reaction product of an epoxy-containing polymer with a compound containing phosphorus acid groups, the reaction product having reactive functional groups,

10 ii. a curing agent having functional groups reactive with the functional groups of (i);

10 b. an electroconductive pigment dispersed in (a) such that the weight ratio of b to (i) plus (ii) is within the range of 0.5 to 9.0:1,

15 the curable coating composition being characterized such that when it is deposited and cured on a metal substrate, the cured coating is weldable.

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2. The curable coating composition according to claim 1 in which the epoxy-containing polymer is a polyglycidyl ether of a polyhydric phenol.

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3. The curable coating composition according to claim 2 where the polyhydric phenol is Bisphenol A.

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4. The curable coating composition according to claim 1 wherein the molecular weight of the epoxy-containing polymer is 220-4500 based on epoxy equivalent multiplied by the epoxy functionality.

5. The curable coating composition according to claim 1 wherein the compound containing phosphorus acid groups is selected from the group comprising phosphoric acid, a phosphonic acid, and phosphorous acid.

6. The curable coating composition according to claim 1 wherein the equivalent ratio of the compound containing phosphorus acid groups to epoxy-containing polymer is within the range of 0.5 to 3.5:1.

5 7. The curable coating composition according to claim 1 wherein the functional groups of (i) are hydroxyl groups or hydroxyl and epoxy groups.

10 8. The curable coating composition according to claim 1 wherein the curing agent is selected from the group comprising aminoplast resins, polyisocyanates, polyacids, organometallic complexed materials, polyamines, and polyamides.

15 9. The curable coating composition according to claim 8 wherein the curing agent is an aminoplast.

10 10. The curable coating composition according to claim 1 wherein said electroconductive pigment is selected from the group comprising zinc, aluminum, iron, graphite, diiron phosphide, tungsten, stainless steel, and mixtures thereof.

20 11. The curable coating composition according to claim 1 wherein the weight percent of (i) based on the total weight of resinous binder is from 50 to 90 percent.

25 12. The curable coating composition according to claim 1 wherein the weight percent of (ii) based on the total weight of resinous binder is from 10 to 50 percent.

30 13. The curable coating composition according to claim 1 wherein the weight percent of (a) based on the total weight of (a) plus (b) is from 10 to 55 percent.

14. The curable coating composition according to claim 1 wherein the weight percent of (b) based on the total weight of (a) plus (b) is from 45 to 90 percent.

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15. The curable coating composition according to claim 1 further comprising corrosion resistant pigments.

16. An aqueous-based curable coating composition comprising:

10 a. a resinous binder comprising

i. a reaction product of an epoxy-containing polymer with a compound containing phosphorus acid groups, the reaction product having reactive functional groups,

15 ii. a curing agent having functional groups reactive with the functional groups of (i);

b. an electroconductive pigment dispersed in (a) such that the weight ratio of b to (i) plus (ii) is within the range of 0.5 to 9.0:1; and

20 c. water,

the coating composition being characterized such that when it is deposited and cured on a metal substrate, the cured coating is weldable.

25 17. The coating composition according to claim 16 further comprising stabilizers, dispersants, and thickeners.

18. The coating composition according to claim 17 wherein the stabilizer/dispersant is potassium tripolyphosphate.

30 19. The coating composition according to claim 16 further comprising an amine.

20. The coating composition according to claim 16 further comprising corrosion inhibiting pigments.

21. An organic solvent-based curable coating composition  
5 comprising:

- a. a resinous binder comprising
  - i. a reaction product of an epoxy-containing polymer with a compound containing phosphorus acid groups, the reaction product having reactive functional groups,
  - ii. a curing agent having functional groups reactive with the functional groups of (i);
- b. an electroconductive pigment dispersed in (a) such that the weight ratio of b to (i) plus (ii) is within the range of 0.5 to 9.0:1; and
- c. an organic solvent,

15 the curable coating composition being characterized such that when it is deposited cured on a metal substrate, the cured coating is weldable.

22. The coating composition according to claim 21 further  
20 comprising corrosion resistant pigments.

23. The coating composition according to claim 21 further comprising an amine.

25 24. The coating composition according to claim 21 wherein the amine is N-methyl or N-ethyl morpholine.

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25. A process for coating a continuous metal sheet comprising:

5           a. applying directly to the metal sheet shortly after it is formed and at a temperature of 20 to 150°C, a curable coating composition comprising:

10           i. a resinous binder comprising

                 (A) a reaction product of an epoxy-containing polymer with a compound containing phosphorus acid groups, the reaction product having reactive functional groups,

                 (B) a curing agent having functional groups reactive with the functional groups of (A);

15           ii. an electroconductive pigment dispersed in (i) such that the weight ratio of (ii) to (A) plus (B) is within the range of 0.5 to 9.0:1,

15           the curable coating composition being characterized such that when it is deposited and cured on a metal substrate, the cured coating is weldable; and

20           b. drying the coating composition on the metal sheet.

26. The process according to claim 25 wherein the metal sheet is selected from the group comprising ferrous metals, non-ferrous metals, and combinations thereof.

25           27. A process for coating a continuous metal sheet comprising:

          a. unwinding the metal sheet from a metal coil and passing the metal sheet in a substantially continuous manner through a cleaning station, a coating station, and a curing station;

- b. applying to the metal sheet at the coating station a curable coating composition comprising:
  - i. a resinous binder comprising:
    - (A) a reaction product of an epoxy-containing polymer with a compound containing phosphorus acid groups, the reaction product having reactive functional groups,
    - (B) a curing agent having functional groups reactive with the functional groups of (A);
  - ii. an electroconductive pigment dispersed in (i) such that the weight ratio of (ii) to (A) plus (B) is within the range of 0.5 to 9.0:1; and
- c. curing the coating composition applied to the metal sheet in step (b) as the coated metal sheet passes through the curing station.

28. A process according to claim 27 further comprising galvanizing the metal sheet and then immediately performing the step of applying the curable coating composition.